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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/692,007	10/19/2000	Stephen P. DeOrnellas	TEGL1082US1 SRM	7175

23910 7590 01/16/2004

FLIESLER DUBB MEYER & LOVEJOY, LLP  
FOUR EMBARCADERO CENTER  
SUITE 400  
SAN FRANCISCO, CA 94111

EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT PAPER NUMBER

1765

DATE MAILED: 01/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/692,007

Applicant(s)

DEORNELLAS ET AL.

db

Examiner

Lynette T. Umez-Eronini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 12/24/2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 10-51 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 10-51 are rejected under 35 U.S.C. 102(b) as being anticipated by Fullowan et al. (US 5,176,792).

As pertaining to claims 10-51, Fullowan teaches a method for etching a pattern on a workpiece including the steps of:

selecting a workpiece with a hard mask deposited over a (tungsten) layer to be etched, which hard mask is comprised of a (titanium mask **12**) reactive metal (column 1, lines 51-54 and column 2, lines 39-44). Since Fullowan uses the same hard mask material as described in the present invention, then using Fullowan's hard mask layer in the same manner as that of the claimed invention would result in said hard mask having a low reactivity to the etch chemistry of an etch process, **as in claim 13** and said hard mask has a low sputter yield and a low reactivity to etch chemistry of an etch process, **as in claims 22 and 28**.

Fullowan also teaches, plasma etching the mask workpiece to selectively remove the unmasked tungsten and performing the etching in a plasma etcher that is water-cooled to room temperature (column 2, lines 55-61), reads on,

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processing the workpiece in a reactor using an etch step and exposing the hard mask to the etch.

Fullowan further teaches, "The present applicants have discovered that a layer predominantly comprising tungsten can be formed into precise patterns having substantially vertical walls by using titanium as a mask and plasma etching in a fluorine-containing plasma such as  $\text{CF}_4$  or  $\text{SF}_6$  . . . Each step in the process can be effected without subjecting the workpiece to voltage magnitudes in excess of 200 volts or temperatures outside the range between room temperature and  $200^\circ\text{C}$ " (column 1, lines 51-64), which reads on,

providing energy to the reactor, **in claim 10**; and

oxidizing the hard mask either prior to or during heating by exposing the hard mask to a stream of oxidizing gas, **in claim 51**; and

which encompasses said step of providing energy at a temperature in the range from about 80 to about 300 C, **in claim 11**. Since Fullowan uses the same method of providing energy, which encompasses the temperature range of the claimed invention, then using Fullowan's method of processing a wafer would inherently result in slowing the rate of erosion of the hard mask by providing energy to the reactor in order to increase a rate of oxidation of the hard mask, **as in claims 10, 13, 22, 25, 26, 28, 29, 30, and 34**.

Fullowan teaches, "As illustrated in FIG. 1C, the third step is etching the mask workpiece to selectively remove the unmasked tungsten . . . This etching is preferably

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reactive ion etching in a fluorine-containing plasma . . ." (column 2, lines 55-38), which shows and reads on,

wherein the hard mask is deposited over the layer to be etched without being deposited on side walls of the layer to be etched, **in claim 50.**

***Response to Arguments***

3. Applicant's arguments with respect to claims 10-49 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465.

*Lynette T. Umez-Eronini*  
ltue

January 12, 2004